FLORISTIC COMPOSITION OF SEASONALLY DRY TROPICAL FOREST FRAGMENTS IN CENTRAL BAHIA, NORTHEASTERN BRAZIL

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ABSTRACT

The Serra do Orobó Mountain range is located in central Bahia State, northeastern Brazil, and occupies an area of approximately 7,300 ha. The range comprises different physiognomies of Seasonally Dry Tropical Forest (SDTF), including semideciduous and riparian forests that grow on the lower slopes at elevations (450 to 700 meters) and fragments of submontane humid forest growing near the summit (700 to 850 meters). A floristic survey was undertaken at the 15 best preserved forest fragment sites scattered along the Orobó range. A total of 615 species within 378 genera and 106 families were sampled, including ten new angiosperm taxa. Angiosperms comprised 597 species within 365 genera and 96 families, while pteridophytes comprised 18 species in 13 genera and 10 families. The floristic diversity of the Orobó site was high in comparison to other SDTF areas in eastern Brazil. Analyses of endemism and floristic relationships suggested that the flora of the seasonally semideciduous forests of the Serra do Orobó mountain range is more closely related to the seasonally dry forest vegetation of the Atlantic Forest domain rather than to the Caatinga domain.

RESUMEN

La Serra do Orobó es un macizo montañoso localizado en el área central del estado de Bahia, región nororiental del Brasil, que ocupa una área de aproximadamente 7.300 ha. Comprende fisonomías diferentes del Bosque Tropical Estacionalmente Seco (SDTF), incluyendo principalmente los bosques semideciduos y los bosques riparianos que crecen en los declives inferiores en elevaciones entre 450 y 700 metros, y un fragmento de bosque submontano húmedo cerca de la cúspide entre 700 y 850 metros. Fue llevado a cabo un estudio florístico en 15 sitios que presentaban fragmentos en buen estado de conservación a lo largo de la Serra do Orobó. Fueron muestreados un total de 615 especies en 378 genera y 106 familias, incluyendo diez nuevos taxa de diferentes familias de angiospermas. Las angiospermas abarcan 597 especies en 365 genera y 96 familias y las pteridofitas incluyeron 18 especies en 13 genera y 10 familias. La diversidad floristica fue alta comparado con otras áreas de SDTF en el Brasil Oriental. Los análisis de endemismo y de relaciones floristicas sugieren que la flora del bosque estacionalmente semideciduo de la Serra do Orobó se relaciona más a la vegetación del bosque seco del dominio de la Floresta Atlántica que al del dominio de las Caatingas.

INTRODUCTION

Seasonally Dry Tropical Forests (SDTF) are one of the world's most threatened ecosystems. Miles et al. (2006) observed that ca. 97% of these dry forest remnants are at risk for biodiversity loss due to a number of different anthropogenic threats, such as habitat fragmentation, climatic change, fire, or conversion into cultivated areas. However, SDTF have received relatively little attention from conservationists and ecologists in comparison to humid forests (Pennington et al. 2006b).

Little is presently known about the floristic diversity of neotropical SDTF although in recent years there has been an increasing interest in this vegetation type (Gentry 1995; Giulietti et al. 2006; Pennington et al. 2006a). However, the growing knowledge of the SDTF flora has stimulated the formulation of various hypotheses concerning the historical biogeography of this vegetation (Prado & Gibbs 1993; Pennington et al. 2000, 2004; Prado 2000; Lavin et al. 2004; Queiroz 2006a) and the geographical distribution of its component species, and studies have indicated that SDTF are independent phytogeographical units distributed disjunctly through South and Central America (Pennington et al. 2000; Prado 2000).

According to the definition elaborated by Pennington et al. (2000), the neotropical SDTF comprehend different physiognomies, and can include both forests as well as more open vegetation types where shrubs predominate. Terrestrial bromeliads and succulent plants belonging to Cactaceae and Euphorbiaceae are

common in SDTF areas, as well as an ephemeral herbaceous component apparent only during the short rainy season. Another important aspect characterizing SDTF is their markedly seasonal phenology of flowering and fruiting, with many species demonstrating synchronous flowering at the transition between the dry and the rainy seasons (Machado et al. 1997).

The Caatinga domain constitutes the largest and most isolated nucleus of the SDTF (Queiroz 2006a). It occupies ca. 800,000 Km^2 in the northeastern section of Brazil (Ab'Sáber 1974) with a semi-arid climate mainly in the low altitude areas between extensive plateaus and/or mountain ranges (Prado 2003; Queiroz 2006a). Andrade-Lima (1981) noted that the vegetation of the Caatinga domain comprised different physiognomies, including areas of open vegetation dominated by shrubs or areas with relatively tall forests. These seasonally dry forests are commonly referred to as arboreal caatinga, dry forests, or deciduous forests, and occur as highly fragmented areas throughout the semi-arid region of northeastern Brazil, principally from Bahia State through northern Minas Gerais State. In spite of the fact that these dry tall forest areas are situated within the Caatinga domain (Rizzini 1979; Andrade-Lima 1981), different workers have indicated that they may in fact be phytogeographically more related to the dry vegetation of the Atlantic Forest domain (Oliveira-Filho & Fontes 2000; Amorim et al. 2005; Oliveira-Filho et al. 2005, 2006), or may represent disjunct areas of SDTF without any relationship to the humid areas of the Atlantic Coastal Forests (Pennington et al. 2000; Prado 2000). The deciduous and semi-deciduous forests of southern and southeastern Brazil, for example, have been demonstrated to have a strong floristic relationship with the moister sites of Atlantic Coastal Forest and therefore should not be treated as a type of dry tall forest included in the Caatinga domain (Oliveira-Filho & Fontes 2000; Oliveira-Filho et al. 2005). However, Oliveira-Filho et al. (2006) have more recently proposed a wider definition for SDTF that would treat these same deciduous and semi-deciduous forests of the Atlantic Forest domain as another nuclei of SDTF.

As such, it is clear that there are still problems to be resolved concerning the nature of SDTF in eastern South America. The delimitation of SDTF is complicated by the fact that Penington et al. (2000) and Prado (2000) did not include humid forests in their analyses, while Oliveira-Filho et al. (2006), on the other hand, included only a very limited sampling of Caatinga areas. Additionally, the knowledge concerning the floristic composition of many areas of SDTF in northeastern Brazil is still very incipient.

As such, the present study undertook a floristic survey of several fragments of seasonal dry forests in the Serra do Orobó Mountains in central Bahia State. The floristic relationships of these dry forests will be discussed here in terms of the present understanding of the phytogeography of SDTF. Specifically, we intend to demonstrate that the dry forest framents of the Serra do Orobó Mountains are floristically related to the SDTF floras. To account this goal, we will treat the SDTF as a broader definition (sensu Oliveira-Filho et al. 2006) that encompasses the dry sites of the Atlantic Forest domain as a distinct nuclei from the Caatinga domain and discuss the relationships of the Serra do Orobó mountain range with these former nuclei.

Study Area

The Serra do Orobó mountain range is located within the municipalities of Ruy Barbosa and Itaberaba in central Bahia State, Brazil (12°15' – 12°25'S and 40°19' – 40°30'W) (Fig. 1). The range occupies an area of approximately 7,300 ha and has a maximum elevation of 1,014 m (BAHIA 2002). The region has a semi-arid climate (SEI 1998), and although there are no systematic rainfall records for this area, estimates of precipitation in the region place the average annual rainfall at approximately 800 mm (SEI 1998). The average annual temperature is 26 °C, with an absolute maximum of 33 °C, and an absolute minimum of 18 °C (SEI 1998). The forest fragments examined have shallow soils that are sometimes covered by a significant layer of leaf litter. These soils are classified in the main group "luvisoil" and present moderate to high pH and nutrient levels (IBGE/EMBRAPA 2001). In addition, they are comparatively more fertile than those of the nearby savannas.

The Serra do Orobó mountain range is located within the Caatinga domain of northeastern Brazil (Velloso et al. 2002), and several vegetation types can be found there (Fig. 2) according to general altitudinal gradients. A shrubby caatinga with palm trees is most common at lower altitudes, while forests occur

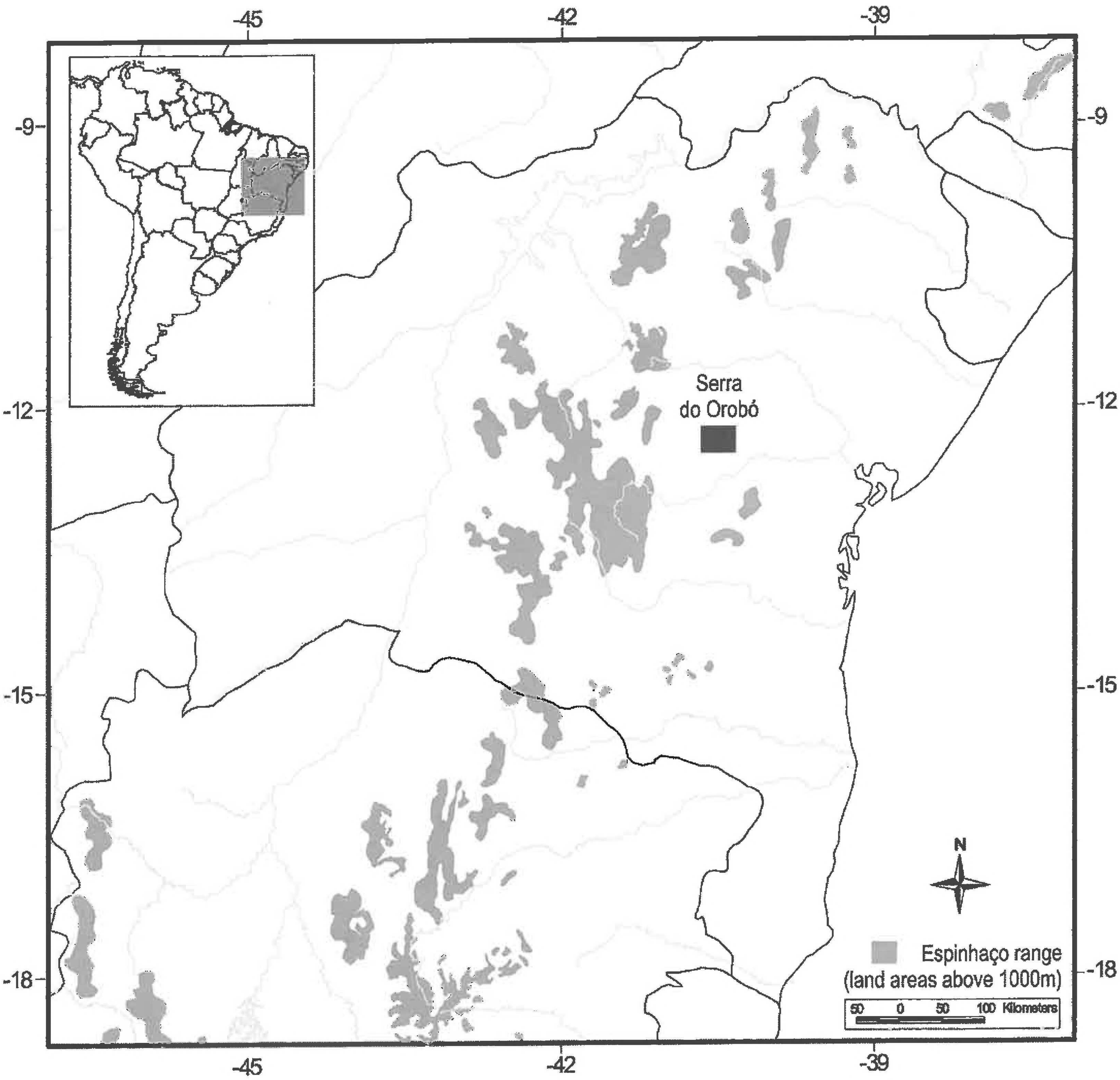

Fig. 1. The localization of the Serra do Orobó Mountains, near the Chapada Diamantina, central Bahia State, Brazil.

at higher altitudes (between 450 and 850 meters). Dry forest fragments and riparian forests are found on the slopes at elevations between 450 and 700 meters. There is a more humid area near the summit on the southern slope (between 700 and 850 meters) harboring a submontane humid forest. Above the forest zone, and surrounding the mountain peaks up to the 900 meters, is a savanna-like vegetation with large populations of *Vellozia furcata* L.B.Sm. & Ayensu (Velloziaceae). Near the summit, the rock outcrops harbor *campo rupestre* (rocky field) vegetation.

Although the Serra do Orobó has suffered strong anthropogenic alterations in 400 years of European colonization, some forest fragments are still relatively well-preserved. These fragments have extremely high conservation value as they represent some of the last intact fragments of dry forest in northeastern Brazil. Additionally, many new species belonging to different groups, such as the fungi (*Neojhonstonia minima*, Gusmão & Grandi 2001), psychodid flies (*Psychoda serraorobonensis*, Bravo et al. 2006) have been described from this area. Besides, some new species of plants from the *campo rupestre* vegetation were identified and are in process of publication (*Calliandra*, Fabaceae–E.R.Souza & L.P.de Queiroz, pers. comm.; two new

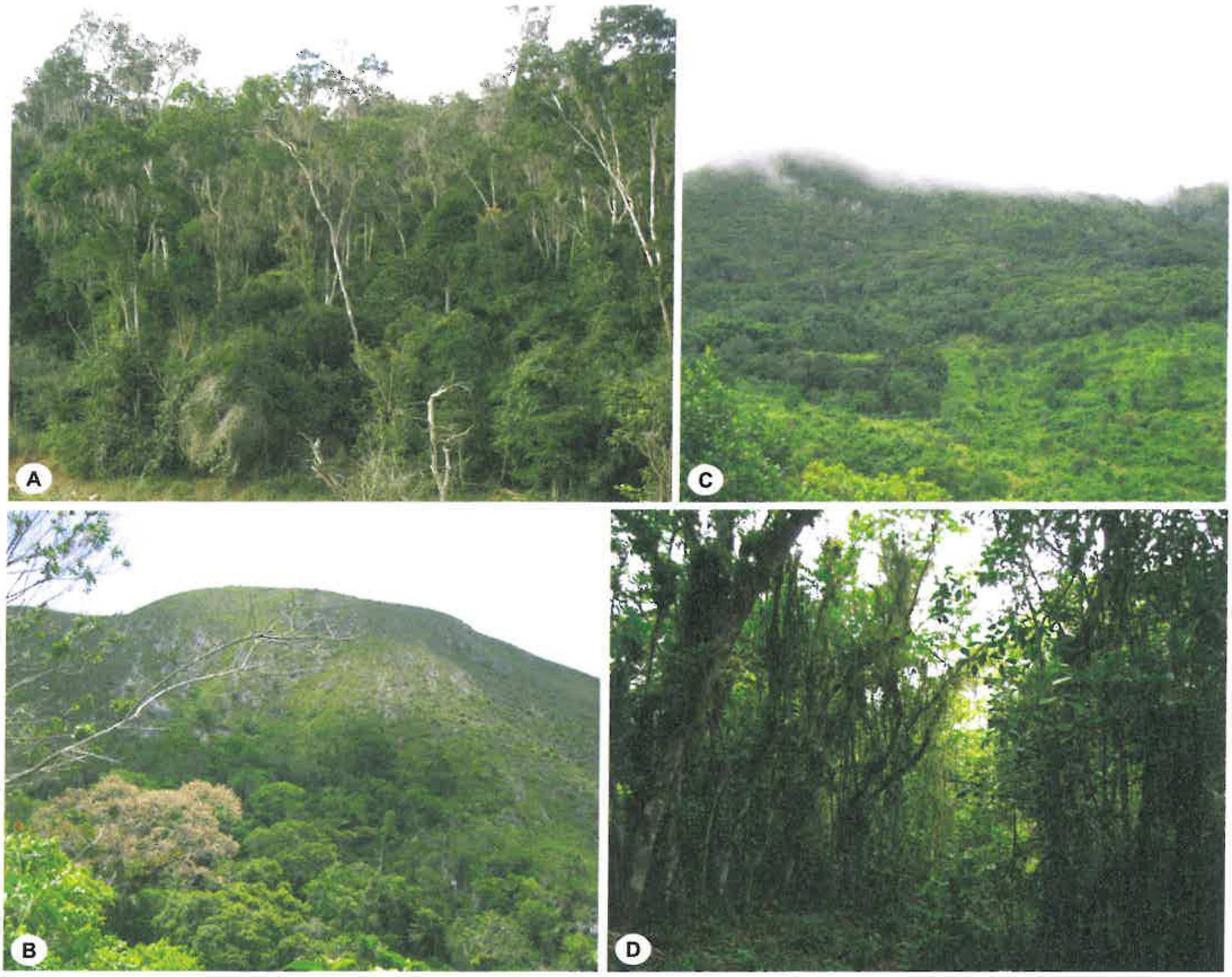

Fig. 2. Different forest physiognomies found in the Serra do Orobó Mountains, Bahia State, Brazil. A. A fragment of semideciduous forest; B. Riparian forest extending almost to the top of the mountain, with *Eriotheca* cf. *globosa* in bloom; C. A fragment of humid forest covered by fog; D. Interior of the humid forest, showing many epiphytes.

species of *Marcetia*, Melastomataceae–A.K.A.Santos, pers. comm.; *Mitracarpus*, Rubiaceae–E.B.Souza, pers. comm.; *Oncidium*, Orchidaceae–C.van den Berg, pers. comm.; and *Sauvagesia*, Ochnaceae–D.Cardoso, pers. comm.).

In 2002, the forest remnants as well as the *campo rupestre* vegetation of the Serra do Orobó mountain range were assigned the status of sustainable use protection areas in recognition of their importance to conservation and to biodiversity research.

METHODS

A floristic survey was carried out from August 2004 to June 2006 in the best preserved sites of semideciduous, riparian, and submontane humid forest fragments. The vegetation classification used here for each forest fragment follows Veloso et al. (1991) and stresses the distinct physiognomies and ecological conditions observed in each. It was studied 8 fragments of semideciduous forests (2.85 km^2), 6 of riparian forests (0.37 km^2) and one of submontane humid forest (0.07 km^2).

During the course of the present study a total of 15 field trips were carried out, each lasting from three to four days. Of all the 15 studied fragments, the submontane humid forest one was the unique where our collect effort was lower due to its difficult access and because it was discovered only recently. All fertile material of vascular plants was collected according to the standard methods described by Filgueiras et al.

(1994). In some cases, sterile collections were made for species never encountered with flowers or fruits. A total of 1,385 voucher collections were made and subsequently stored at the Feira de Santana State University Herbarium (HUEFS). In some cases, species that were very difficult to collect were included in the checklist if they could be positively identified in the field; these are indicated as "Not collected" in Appendix 1.

All specimens were identified by the authors with the aid of identified collections stored at the HUEFS and/or by using specific bibliographies. Specimens identified only to genus or family, are clearly labeled in the Appendix. Duplicates were sent to specialists in order to provide or to confirm identifications.

Angiosperm families are organized according to APG II (2003) in the floristic list, and the pteridophytes according to Tryon and Tryon (1982). Authors of species are abbreviated according to Brummit and Powell (1992).

RESULTS

The vascular flora of the forest vegetation of the Serra do Orobó mountain range comprises 615 species belonging to 378 genera and 106 families (Appendix 1). Angiosperms are represented by 597 species in 365 genera and 96 families. The pteridophytes included 18 species belonging to 13 genera and 10 families. A total of 561 taxa were identified to species rank (91.2%). However, in some groups (especially the Myrtaceae), many taxa were identified only to the genera (51 specimens, or 8.3% of the total collection) or family rank (3 specimens, 0.5%) due to their taxonomic difficulty.

The semideciduous forests demonstrated the greatest species richness (465 spp.), while 141 and 87 species were sampled in the riparian and in the submontane humid forests, respectively. Considering all forest fragments together, the commonest life form was trees (182 species), followed by vines (138), herbs (111), shrubs (104), subshrubs (45), and epiphytes (35). The most diverse families were Fabaceae (95 species), Euphorbiaceae (38), Apocynaceae (24), Orchidaceae (24), Rubiaceae (24), Asteraceae (22), Bignoniaceae (19), Myrtaceae (18), Malvaceae (17), and Rutaceae (15), which together comprised 48% of the total number of species surveyed in the Serra do Orobó mountain range. Thirty-five families were represented by only a single species. The most species-rich genera were *Croton* (11 species), *Passiflora* (8), *Senna* (8), *Eugenia* (7), *Myrcia* (7), *Solanum* (7), *Miconia* (6), *Bauhinia* (5), and *Senegalia* (5).

Several species were identified by different specialists as being new taxa (Fig. 3). These included: *Dorstenia caatingae* (Moraceae; Castro & Rapini 2006), *Phanera trichosepala* (Fabaceae, Queiroz 2006b), and undescribed species belonging to the genera *Cratylia* (Fabaceae–L.P.de Queiroz, pers. comm.), *Conchocarpus* (Rutaceae–J.R.Pirani, pers. comm.), *Dichorisandra* (Commelinaceae–L.Aona, pers. comm.), *Eugenia* (Myrtaceae–M.Sobral, pers. comm.), *Sinningia* (Gesneriaceae–A.Chautems, pers. comm.), *Solanum* (Solanaceae–L.P.de Queiroz & D.Cardoso, pers. comm..), *Standleya* (Rubiaceae–J.G.Jardim, pers. comm.), and *Spermacoce* (Rubiaceae–E.B.Souza and E.L.Cabral, pers. comm.). Additionally, of the total number of species collected, 12 were considered to be endemic to the dry forest fragments of Serra do Orobó or to the adjacent dry forest areas. These species are marked by an asterisk in the Appendix 1.

In addition to these new species, other taxa were collected for the first time in Bahia State, including *Bulbophyllum sanderianum* (Orchidaceae), *Croton warmingii* (Euphorbiaceae), and *Oxalis roselata* (Oxalidaceae) (Fig. 3). Other interesting collections included *Cordia blanchetii* (Boraginaceae), *Heteranthia decipiens* (Solanaceae), and *Passiflora bahiensis* (Passifloraceae), which were only previously known from their type material collected in Bahia; as well as *Pogoniopsis schenckii* and *Wullschlaegelia calcarata*, both very uncommon saprophytic orchids (Fig. 3).

The forest fragments were composed of different plant strata. In general there was a continuous canopy ca. 20 meters high, composed of *Aspidosperma parvifolium* (Apocynaceae), *Cariniana estrellensis* (Lecythidaceae), *Centrolobium tomentosum* (Fabaceae), *Cnidoscolus oligandrus* (Euphorbiaceae), *Ficus pulchella* (Moraceae), *Heisteria blanchetiana* (Olacaceae), *Hirtella glandulosa* (Chrysobalanaceae), *Nectandra* cf. *membranacea* (Lauraceae), *Myrsine ferruginea* (Myrsinaceae), *Peltogyne confertiflora* (Fabaceae), *Piptadenia paniculata* (Fabaceae), and *Vantanea compacta* (Humiriaceae). Emergent trees could reach up to 30–45 meters, and included *Eriotheca*

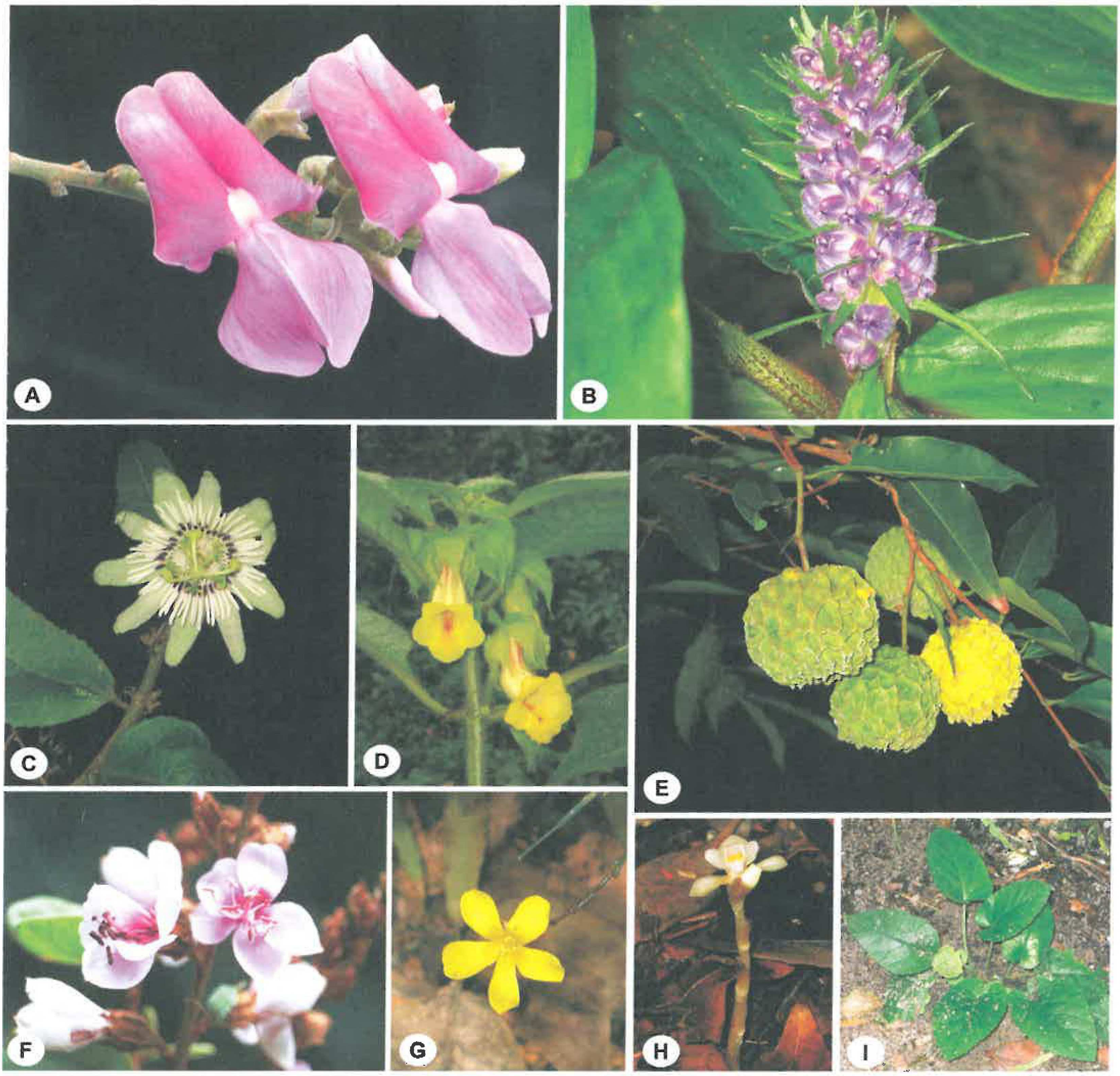

Fig. 3. Some representatives of the flora of the Serra do Orobó Mountains. A. *Cratylia* sp. nov.; B. *Dichorisandra* sp. nov.; C. *Passiflora bahiensis*; D. *Sinningia* sp. nov.; E. *Eugenia* sp. nov.; F. *Phanera trichosepala*; G. *Oxalis roselata*; H. *Pogoniopsis schenkii*; I. *Dorstenia caatingae*.

cf. *globosa* (Malvaceae), *Caesalpinia leiostachya* (Fabaceae), *Cavanillesia arborea* (Malvaceae), *Ficus cyclophylla*, *F. gomelleira* (Moraceae), *Goniorrhachis marginata* (Fabaceae), *Vochysia* sp. (Vochysiaceae), and *Manilkara rufula* (Sapotaceae). Several vine species, mostly belonging to the families Apocynaceae, Bignoniaceae, Fabaceae, Passifloraceae, and Sapindaceae, occur in the canopy, within treefall gaps, or along the edges of the forest fragments. The subcanopy was dominated by species of Euphorbiaceae, Fabaceae, Myrtaceae, Melastomataceae, Rubiaceae, and Rutaceae.

The submontane humid forest fragment was the richest area for epiphytes, including *Anthurium pentaphyllum*, *A. scandens* (Araceae), *Nematanthus albus* (Gesneriaceae), *Oncidium ciliatum*, *O. flexuosum* (Orchidaceae), *Peperomia* sp. (Piperaceae), *Tillandsia stricta* (Bromeliaceae), and *Vriesea simplex* (Bromeliaceae). This submontane humid forest fragment also had a dense herbaceous stratum composed of sciophilous herbs such as *Paepalanthus spatulathus* (Eriocaulaceae), *Sinningia barbata* (Gesneriaceae), *Begonia petasitifolia* (Begoniaceae), *Dichaea congniauxiana* (Orchidaceae), *Sobralia sessilis* (Orchidaceae), *Gibasis geniculata* (Commelinaceae), *Ichnanthus grandifolius* (Poaceae), and *Ruellia affinis* (Acanthaceae).

The commonest species found at forest edges and in disturbed sites were the trees *Albizia polycephala* (Fabaceae) and *Maclura tinctoria* (Moraceae), the shrubs *Diospyros inconstans* (Ebenaceae), *Lantana camara* (Verbenaceae), and *Senna aversiflora* (Fabaceae), the vines *Arrabidaea cinerea* (Bignoniaceae), *Chaetocalyx scandens* (Fabaceae), *Dicella bracteosa* (Malpighiaceae), *Macroptilium erythroloma* Fabaceae), and *Periandra coccinea* (Fabaceae), and the herbs *Chaptalia integerrima*, *Emilia fosbergii* (Asteraceae), *Pavonia martii* (Malvaceae), *Hyptis pectinata*, and *H. suaveolens* (Lamiaceae).

Some tree species present in the best preserved forest fragments, such as *Gallesia integrifolia* ("pau-d'alho", Phytolaccaceae) and *Caesalpinia leiostachya* ("pau-ferro"), are used locally as folk medicines. Additionally, we found evidence of fully grown trees being harvested for their wood, including *Copaifera langsdorffii* ("pau-d'óleo", Fabaceae), *Brosimum guianense* ("oiticica", Moraceae), *Ocotea glomerata* ("lôro", Lauraceae), and *Hymenaea courbaril*. ("jatobá," Fabaceae).

DISCUSSION

Floristic diversity

The forest fragments of Serra do Orobó mountain range demonstrated a relatively higher number of species in comparison to other Brazilian semideciduous forests, even comparing the arboreal component only (Meira-Neto et al. 1989; Oliveira-Filho & Machado 1993; Soares-Filho 2000; Werneck et al. 2000; Jarenkow & Waechter 2001; Moura & Sampaio 2001; Cielo-Filho & Santin 2002; Paula et al. 2002; Silva & Soares 2002; Nunes et al. 2003; Souza et al. 2003; Andrade & Rodal 2004; Toniato & Oliveira-Filho 2004; Rodal & Nascimento 2006; Macedo 2007), or shrubby *caatinga* (Rodal et al 1998; Lemos & Rodal 2002; Pereira et al. 2002; Alcoforado-Filho et al. 2003; Nascimento et al. 2003; Andrade et al. 2004; Rocha et al. 2004), riparian forests (Vilela et al. 1995; Funch 1997; Passos-Júnior 1999; Stradmann 2000; Ribeiro-Filho 2002; Lacerda et al. 2005), or enclaves of humid forests within the *caatinga* (locally known as "brejo de altitude") (Tavares et al. 2000; Rodal & Nascimento 2002; Melo & Rodal 2003; Agra et al. 2004; Barbosa et al. 2004).

The species richness encountered in the submontane humid forest (87 spp.) was surprisingly lower than would normally be expected in this forest physiognomy in comparison with other studies (Mori 1989; Lombardi & Gonçalves 2000; Tavares et al. 2000; Carvalho-Sobrinho & Queiroz 2005; Amorim et al. 2005; Neves 2005; Martini et al. 2007), and lower also that observed in the dry and riparian forest fragments of the same mountain range. This may be due to the reduced size of the fragment examined, and/or to the relatively low sampling effort in this area. As such, more field trips to the area may reveal the presence of other species not yet recorded.

With minor variations, the ten most species-rich families in this survey were the same families identified as important in other SDTF sites, irrespective of the general aspects of the local climate, soil, and forest physiognomy. Similarly, several of these families (usually Fabaceae, Euphorbiaceae, Apocynaceae, Bignoniaceae, Myrtaceae, and Rubiaceae) were important in sand dune areas of the middle São Francisco river in northeastern Brazil (Nascimento et al. 2003; Rocha et al. 2004), in caatinga areas on sandy soils (Araújo et al. 1998; Rodal et al. 1998; Andrade et al. 2004), shrub caatinga areas on crystalline basement rocks (Pereira et al. 2002; Alcoforado-Filho et al. 2003), semideciduous forests in southeastern and southern Brazil (Jarenkow & Waechter 2001; Cielo-Filho & Santin 2002; Paula et al. 2002; Silva & Soares 2002; Toniato & Oliveira-Filho 2004), riparian forests in the Chapada Diamantina of Bahia State (Funch 1997; Passos-Júnior 1999; Stradmann 2000; Ribeiro-Filho 2002), as well as in several neotropical SDTF (Pennington et al. 2000; Bridgewater et al. 2003; Linares-Palomino et al. 2003). Fabaceae was the most species-rich family in the Serra do Orobó mountain range as well as in the other sites referred to above. Schrire et al. (2005) presented historical and biogeographical evidence supporting the hypothesis of a long term association between legumes and dry forests. Amongst the vines, the families with the greatest numbers of species in the Serra do Orobó (Apocynaceae, Bignoniaceae, Malpighiaceae, Fabaceae, and Sapindaceae) were also encountered in other semideciduous forest fragments (Hora & Soares 2002; Udulutsch et al. 2004). These too similar species richness at the family level encountered throughtout different physiognomies of dry vegetation in

Brazil as well as in the Central and northern South America may also be concerned for justifying that the Serra do Orobó mountain range should be included into a broad definition of SDTF.

On the other hand, a more restrict evaluation comparing the most species-rich genera may be suggestive to stress that within the different physiognomies of SDTF in eastern Brazil, the dry forest fragments of the Serra do Orobó Mountains should be floristically related to the semideciduous forests of the Atlantic Forest domain rather than to the dry shrub-arboreal vegetation of the Caatinga domain. For example, most of the genera comprising the largest numbers of species identified in this survey, such as *Croton*, *Passiflora*, *Miconia*, *Myrcia*, *Eugenia*, *Solanum*, and *Bauhinia* are better represented in several areas of semideciduous forests (e.g. Soares-Filho 2000; Paula et al. 2002; Silva & Soares 2002; Nunes et al. 2003; Andrade & Rodal 2004; Amorim et al. 2005; Macedo 2007) than in shrub-arboreal caatinga areas (Araújo et al. 1998; Rodal et al. 1998; Lemos & Rodal 2002; Pereira et al. 2002; Alcoforado-Filho et al. 2003; Cardoso & Queiroz, unpublished data). Moreover, the paucity of Cactaceae species in the Serra do Orobó Mountains is another evidence for lack of closer relationship with the Caatinga domain, where this family is usually abundant (see for example Taylor & Zappi 2002; Rocha et al. 2004; Gomes et al. 2006).

Endemism

Among the 152 arboreal species surveyed in the dry forest fragments in the Serra do Orobó Mountains, 16 (see Appendix 1) are conspicuous representatives of the SDTF flora (Prado & Gibbs 1993). Besides, the genera *Apuleia* (Fabaceae), *Brasiliopuntia* (Cactaceae), and *Pterogyne* (Leguminosae) surveyed here are endemic to the SDTF as a whole (Prado 2000). In addition, another 14 species considered endemic to the caatinga domain occur in the dry forest fragments of the Serra do Orobó Mountains or in other nearby areas, such as *Anemopaegma laeve* (Bignoniaceae), *Apodanthera glaziovii* (Cucurbitaceae), *Averrhoidium gardnerianum* (Sapindaceae), *Capparis jacobinae* (Brassicaceae), *Heteranthia decipiens* (Solanaceae), and *Senna acuruensis* var. *caatingae* (Fabaceae) (Giulietti et al. 2002). This highlights that the Serra do Orobó Mountains may be indeed related to the other remmants of seasonlly dry forests of the neotropics.

The presence of a considerable number of new species (ten) in the dry forest fragments in the Serra do Orobó Mountains may be explained in term of the processes of metacommunities, a model recently put forward for explaining the maintenance of diversity within SDTF (Lavin et al. 2004; Schrire et al. 2005). These authors propose that the biogeography of the succulent biome (which includes neotropical SDTF) can be better understood on a global scale by postulating metacommunities than by proposing historical processes of speciation due to climatic changes or tectonic movements. According to this model, SDTF occur in isolated areas (i.e. much like islands isolated within the continental area), with each area functioning like a local community that is linked to other areas through species exchange based on random dispersal events. The more extreme environmental conditions in SDTF restrict colonization by species originating in most other vegetation formations (Lavin et al. 2004), limiting the rate of immigration into a given local community and resulting in floras that are locally endemic. These processes also result in genera with very few species in local SDTF communities, in contrast with those observed in humid forests (Lavin 2006). For example, the most diverse genera in SDTF (e.g. *Senegalia*, *Croton*, *Machaerium*, *Mimosa*, *Senna*, and *Zanthoxylum*) usually do not comprise more than ten species in any given forest area (see Werneck et al. 2000; Nascimento et al. 2003; Rodal & Nascimento 2002; Bridgewater et al. 2003; Linares-Palomino et al. 2003; Melo & Rodal 2003; Rodrigues et al. 2003; Santos & Kinoshita 2003; Andrade & Rodal 2004; Lemos 2004; Rocha et al. 2004; and this study), while the most diverse genera in humid forests (e.g. *Eugenia*, *Inga*, *Miconia*, *Myrcia*, *Pouteria*, *Psychotria*, and *Solanum*) can have from 15 to even 27 species of the same genus occurring in the same locality (see Amorim et al. 2005; Neves 2005; Moreno et al. 2003; Lombardi & Gonçalves 2000; Oliveira & Amaral 2004; Martini et al. 2007).

The dry forests of Brazil are distributed in a fragmented and isolated fashion (very much like islands), which has led to the appearance of a significant number of endemic species. For example, 12 species encountered in this study had distributions limited to the forest fragments of the Serra do Orobó Mountains and adjacent areas. As such, we suggest that the endemism observed in these forests can be explained (on

a regional level) by the processes of metacommunities, in much the same way as species exchange has been proposed on a continent scale (Lavin et al. 2004; Lavin 2006; Schrire et al. 2005). In that context, the forest vegetation of the Serra do Orobó Mountains as a whole could be viewed as a local community that is isolated from other dry forest fragments found in eastern Brazil. Additionally, the recognition that this set of dry forest fragments (together with the Serra do Orobó Mountains) is a regional metacommunity is supported by the presence of disjunct species among the different areas—a pattern that has been similarly observed at a continental scale among the different nuclei of SDTF (Pennington et al. 2006b; Lavin et al. 2004). *Cordia blanchetii*, for example, has only been observed in the Serra do Orobó Mountains and in another dry forest fragment in Jequié, Bahia State; *Passiflora bahiensis* has been recorded only in a few collections from an urban forest fragment in Salvador, Bahia; *Croton warmingii* demonstrates a disjunct distribution within other semi-deciduous forest fragments in southeastern Brazil; *Dimorphandra jorgei* and *Senna acutisepala* (Fabaceae) are known in Bahia only from a few semideciduous forest fragments in the southern part of that state; and *Margaritopsis carrascoana* (Rubiaceae) occurs in isolated areas of dry vegetation from Ceará State to northeastern Bahia.

Floristic relationships

Riparian forests.—These forests are closely associated with rivers and are widely distributed throughout Brazil, principally in the central region of the country (Oliveira-Filho & Ratter 1995), although local abiotic conditions may not always be adequate for the establishment of typical riparian forests (Rodrigues 2000). The riverside forests of the Serra do Orobó Mountains grow in steep and relatively narrow valleys. As such, their contact with the neighboring semideciduous forests is very great, and frequently results in intercalation with species commonly found in those forests, such as *Cupania rigida* (Sapindaceae), *Dictyoloma vandellianum* (Rutaceae), *Machaerium acutifolium* (Fabaceae), *Pera glabrata* (Euphorbiaceae), *Piper arboreum* (Piperaceae), *Shoepfia brasiliensis* (Olacaceae), and *Vitex* aff. *klugii* (Lamiaceae). However, a majority of the arboreal species encountered in the riparian forests occur only in this vegetation type. Many of the species occurring in the Serra do Orobó Mountains have been reported from riparian forests in the Chapada Diamantina in central Bahia (Funch 1997; Passos-Júnior 1999; Stradmann 2000; Ribeiro-Filho 2002) as, for example, *Bowdichia virgilioides* (Fabaceae), *Byrsonima sericea* (Malpighiaceae), *Clusia nemorosa* (Clusiaceae), *Ficus pulchella* (Moraceae), *Inga thibaudiana* (Fabaceae), *Pouteria ramiflora* (Sapotaceae), *Sloanea guianensis* (Elaeocarpaceae), *Simarouba amara* (Simaroubaceae), *Richeria grandis* (Euphorbiaceae), *Roupala montana* (Proteaceae), and *Vantanea compacta*. However, some species observed in the riparian forests of the Serra do Orobó Mountains are widely distributed within the riparian forests of central Brazil, such as *Copaifera langsdorffii*, *Hirtella glandulosa*, *Tapirira guianensis*, and the tree-fern *Cyathea delgadii* (Cyatheaceae) as noted by Oliveira-Filho & Ratter (1995). These same authors postulated that these riparian forests could act as ecological corridors linking the two principal nuclei of humid forests in South America (the Atlantic Coastal Forest and the Amazon Forest) due to their dendritic distribution throughout all of the Cerrado Biome in central Brazil.

Semideciduous and humid forest fragments.—The classification of the seasonal dry forests of northeastern Brazil is still a controversial subject. Andrade-Lima (1981) considered these forests as being related to arboreal caatinga, and thus part of the Caatinga domain. Prado (2000) and Pennington et al. (2000), based principally on the patterns of distribution of the arboreal species, adopted a similar circumscription, but considered the caatinga and the seasonal dry forests of eastern Brazil as part of a greater phytogeographical unit of the neotropics—the so common referred seasonally dry tropical forests (SDTF)—as distinct from the Atlantic Coastal Forest. This phytogeographical unit would comprise a large variety of vegetation formations, from tall forests in more humid areas to cactus scrub in the driest regions. This controversy can be clearly seen in the great variety of names applied to these different physiognomies, such as: tropical and subtropical dry forests, caatinga, mesotrophic, mesophilous or mesophytic forest, semideciduous or deciduous forest, *bosque caducifólio*, and thorn woodland (Pennington et al. 2000).

On the other hand, Oliveira-Filho et al. (2006) performed similarity analyses with areas of seasonal dry forests, shrub-arboreal caatinga, and humid Atlantic Coastal Forest areas, and identified greater floristic

affinity between seasonal dry forests and Atlantic Coastal Forest areas than with shrub-arboreal caatinga vegetation. As such, Oliveira-Filho et al. (2006) proposed a wider definition of SDTF of eastern South America that would include the three major floristic nuclei of dry vegetation formations: the Caatinga, the Chaco, and the seasonal forests of the Atlantic Forest domain, sensu latissimo.

An analysis of arboreal and shrub species distributions from semideciduous and humid forest fragments in the Serra do Orobó Mountains demonstrated that 106 species (46.5%) also occur in areas of the Atlantic Forest domain (sensu Oliveira-Filho et al. 2006), including *Chrysophyllum gonocarpum* (Sapotaceae), *Esenbeckia leiocarpa* (Rutaceae), *Lonchocarpus cultratus* (Fabaceae), *Myrcia rostrata* (Myrtaceae), *Swartzia apetala* (Fabaceae), and *Trichilia hirta* (Meliaceae). A total of 56 species (24%) were common to areas sampled in the Caatinga domain, and included *Aspidosperma pyrifolium* (Apocynaceae), *Mimosa tenuiflora*, *Poeppigia procera*, *Senna spectabilis* (Fabaceae), and *Ziziphus joazeiro* (Rhamnaceae) (Giulietti et al. 2006). Of these species, only nine of were considered as endemic to the Caatinga domain (Giulietti et al. 2002). Additionally, if considering all the 318 endemic species to the Caatinga domain cited by Giulietti et al. (2002), another eight non arboreal or shrub species occur in dry forest fragments of the Serra do Orobó Mountains or in other nearby areas. However, these 17 species make up only 4.5% of the total endemic flora of the Caatinga domain, suggesting that the dry forests of the Serra do Orobó Mountains might not be phytogeographically related to the Caatinga domain, but rather are of Atlantic Forest vegetation. Therefore, these numbers reinforce the hypothesis of Oliveira-Filho et al. (2006) that the semideciduous forests of eastern Brazil are floristically more closely related to the Atlantic Forest domain than to the Caatinga domain.

These suggestions are further strengthened by comparisons made between the flora of the Serra do Orobó Mountains and the Serra do Teimoso Reserve (a fragment of Atlantic Coastal Forest in southern Bahia State). The Serra do Teimoso Mountains, like the Serra do Orobó Mountains, have dry vegetation at their lower altitudes but more humid conditions exist at greater elevations, and the flora there is more closely related to the Atlantic Forest domain than to the SDTF sensu Pennington et al. (2000) (Amorim et al. 2005). Among the 252 arboreal species that occur in the Serra do Teimoso Mountains, 52 can also be found in the Serra do Orobó Mountains, including *Andira fraxinifolia* (Fabaceae), *Brasiliopuntia brasiliensis* (Cactaceae), *Brosimum guianense* (Moraceae), *Cavanillesia arborea* (Malvaceae), *Caesalpinia pluviosa, Centrolobium tomentosum*, *Goniorrhachis marginata* (Fabaceae), *Guapira opposita* (Nyctaginaceae), *Urera caracasana* (Urticaceae), and *Zanthoxylum rhoifolium* (Rutaceae). Examples of shrubs and herbaceous species held in common include: *Costus spiralis* (Costaceae), *Sinningia barbata* (Gesneriaceae), *Coccoloba declinata* (Polygonaceae), *Faramea hyacinthina* (Rubiaceae), and *Conchocarpus macrophyllus* (Rutaceae). Additionally, species such as *Croton warmingii* (Euphorbiaceae), *Dimorphandra jorgei* (Fabaceae), and *Heteropterys macrostachya* (Malpighiaceae) demonstrate a disjunct distribution pattern between the Serra do Orobó Mountains and the semideciduous forests within the Atlantic Forest domain.

Thus, while there exists significant data demonstrating a close phytogeographical relationship between the Serra do Orobó Mountains and the SDTF nuclei of seasonal dry forests within the Atlantic Forest domain, additional studies involving a larger number of areas also from the Caatinga domain would be useful in confirming some of the conclusions presented here.

APPENDIX 1

Species list of the plants found in semideciduous, riparian, and submontane humid forests of the Serra do Orobó Mountains, Bahia State, Brazil. The asterisk before the species names highlights the endemics from Serra do Orobó mountain range and/or adjacent dry forest areas and a circle refers to the representative arboreal species of SDTF according to Prado & Gibbs (2002). Abbreviations for vegetation types: SF: semideciduous, RF: riparian, and ShF: submontane humid forests; abbreviations for collectors are: LP=L.P.de Queiroz; C=D.Cardoso; N=F.R.Nonato; H=R.M.Harley; B=H.P.Bautista; P=G.C.P.Pinto; L=J.C.Lima; CO=T.A.B.Costa; RC=R.M.de Castro, and S=E.C.Smidt; abbreviations for life forms are: Sub=Subshrub; Epi=Epiphyte.

ANGIOSPERMS

Acanthaceae

Anisacanthus brasiliensis Lindau – LP 9383; Sub, SF
Justicia sp. – LP 9981; Herb, SF
Lepidagathis sp. – C 387; Sub, SF
Ruellia affinis Lindau – LP 10771; C 296; Vine, ShF
Ruellia bahiensis (Nees) Morong – C 381; Sub, SF

Agavaceae

Herreria salsaparilha Mart. – LP 12022; Vine, SF

Amaranthaceae

Alternanthera brasiliana (L.) Kuntze – LP 9538; Herb, RF
Gomphrena demissa Mart. – LP 9801; Herb, SF

Amaryllidaceae

Hippeastrum stylosum Herb. – C 835; Herb, SF

Anacardiaceae

Anacardium occidentale L. – LP 9392, 9434; Tree, SF
Spondias venulosa (Engl.) Engl. – LP 9470, 12028; Tree, SF
Tapirira guianensis Aubl. – LP 9778, 9802; C 343; Tree, RF, SF

Annonaceae

Oxandra reticulata Maas – LP 9788; Tree, SF
Rollinia emarginata Schltdl. – LP 9840; Tree, SF
Rollinia sylvatica (A.St.-Hil.) Mart. – LP 9967, 10663; C 1232; Tree, SF

Apocynaceae

Asclepias curassavica L. – LP 9551; Sub, SF
° *Aspidosperma discolor* A.DC. – C 1274, Tree, ShF
Aspidosperma parvifolium A.DC. – LP 9816, 12230; Tree, SF
° *Aspidosperma pyrifolium* Mart. – LP 9785; Tree, SF
Blepharodon nitidum (Vell.) J.F.Macbr. – LP 9876; C 356; Vine, RF, SF
Ditassa oxyphylla Turcz. – LP 9254, 10686; Vine, RF, SF
Forsteronia sp. – LP 10830; Vine, SF
Forsteronia glabrescens Müll.Arg. – C 1288; Vine, SF
Forsteronia pubescens A.DC. – LP 9944; Vine, SF
Gonolobus cordatus Malme – LP 10837; Vine, SF
Macroditassa adnata (E.Fourn.) Malme – LP 9264; Vine, RF
Mandevilla funiformis (Vell.) K.Schum. – C 270; Vine, SF
Mandevilla scabra (Hoffmanns. ex Roem. & Schult.) K.Schum. – C 324; Vine, RF
Matelea maritima (Jacq.) Woodson – LP 10643; Vine, SF
Oxypetalum erostre E.Fourn. – LP 10763; C 1289; Vine, SF
Oxypetalum pedicellatum subsp. *harleyi* Fontella & Goyder – LP 9851; C 767; Vine, SF
Peltastes peltatus (Vell.) Woodson – LP 12084; C 828; Vine, ShF, SF
Prestonia bahiensis Müll.Arg. – LP 9836; C 1293; Vine, SF
Prestonia coalita (Vell.) Woodson – LP 10689; C 378; Vine, SF
Rauvolfia bahiensis A.DC. – LP 10804, 12247; Tree, ShF
Schubertia multiflora Mart. – LP 10692; Vine, SF
Secondatia floribunda A.DC. – LP 9896; Vine, SF
Tabernaemontana solanifolia A.DC. – LP 9300, 9812; Tree, SF
Temnadenia violacea (Vell.) Miers – LP 9867; C 347; Vine, RF

Araceae

Anthurium pentaphyllum (Aubl.) G.Don – LP 12051; Epi, RF
Anthurium petrophilum K.Krause – C 272; Herb, SF
Anthurium scandens (Aubl.) Engl. – C 1275, Epi, ShF
Monstera adansonii var. *klotzschiana* (Schott) Madison – LP 12090, Epi, ShF
Philodendron pedatum (Hook.) Kunth – LP 9244, 9767; Epi, RF, SF

Arecaceae

Geonoma pauciflora Mart. – LP 9513; Shrub, RF
Geonoma pohliana Mart. – LP 12254; Shrub, ShF
Syagrus coronata (Mart.) Becc. – LP 9846; Tree, SF

Aristolochiaceae

Aristolochia eriantha Mart. & Zucc. – LP 9447; C 798; Vine, SF
Aristolochia gigantea Mart. & Zucc. – H 53484; LP 10668; C 376; Vine, SF

Asteraceae

Asteraceae sp. – LP 9940; Shrub, SF
Acanthospermum australe (Loefl.) Kuntze – C 792; Herb, SF
Achyrocline satureoides (Lam.) DC. – LP 10752; Sub, SF
Acritopappus confertus (Gardner) R.M.King & H.Rob. – LP 12249; Tree, ShF
Baccharis calvescens DC. – H 55454; Shrub, SF
Chaptalia integerrima (Vell.) Burkart – LP 9857; C 358; Herb, SF
Chromolaena cf. *laevigata* (Lam.) R.M.King & H.Rob. – LP 10678; Shrub, SF
Chromolaena morii R.M.King & H.Rob. – LP 10770; Shrub, SF
Cyrtocymura harleyi (H.Rob.) H.Rob. – H 55455; P 389; Shrub, SF
Cyrtocymura scorpioides (Lam.) H.Rob. – H 53480; LP 10709; Shrub, SF
Delilia biflora (L.) Kuntze – LP 10737; Herb, SF
Elephantopus sp. – LP 9543; Herb, RF
Emilia fosbergii Nicolson – C 1284; Herb, SF
Erechtites hieracifolia Raf. ex DC. – LP 12239, Sub, SF
Eremanthus capitatus (Spreng.) MacLeish – LP 12248; Tree, SF
Lepidaploa cotoneaster (Willd. ex Spreng.) H.Rob. – LP 9427; Sub, RF
Mikania cordifolia (L.f.) Willd. – LP 10816; Vine, ShF
Mikania elliptica DC. – LP 9508; Vine, RF
Mikania obovata DC. – C 1278; Vine, ShF
Verbesina macrophylla (Cass.) S.F.Blake – LP 9294; Sub, SF
Vernonanthura brasiliana (L.) H.Rob. – LP 9554; C 805; Shrub, RF, SF
Trixis antimenorrhoea (Schrank) Kuntze – LP 12278; Herb, SF

Begoniaceae

Begonia jairi Brade – LP 9403, 10787; Herb, ShF, SF
Begonia lobata Schott – LP 9925; C 247; Shrub, RF
Begonia petasitifolia Brade – LP 9768, 10751; Sub, RF, ShF
Begonia vitifolia Schott – LP 10790; Shrub, ShF

Bignoniaceae

Adenocalymma sp. – LP 12024; Vine, SF
Anemopaegma laeve DC. – LP 10832; Vine, SF
Arrabidaea craterophora (DC.) Bureau – LP 10677; Vine, SF
Arrabidaea cinerea Poepp. – LP 9253; C 278; Vine, RF, SF
Arrabidaea triplinervia (Mart. ex DC.) Baill. ex Bureau – C 1241; Vine, SF

Arrabidaea lasiantha Bureau & K. Schum. [= *Cuspidaria lasiantha* (Bureau & K. Schum.) A.H. Gentry comb. ined.] – C 280; Vine, SF
Cybistax antisyphilitica (Mart.) Mart. – LP 9475; Tree, SF
Fridericia speciosa Mart. – C 277; CO 17; Vine, SF
Handroanthus heptaphyllus (Vell.) Mattos – LP 12038; Tree, SF
Handroanthus ochraceus (Cham.) Mattos – LP 9969, 9998, 12016; Tree, SF
Jacaranda irwinii A.H.Gentry – C 318; Shrub, RF
Jacaranda jasminoides (Thunb.) Sandwith – LP 10724; Shrub, SF
Lundia cordata (Vell.) A.DC. – LP 10773; C 812; Vine, ShF, SF
Memora valida K.Schum. – LP 9784; B 1236; Vine, SF
Phryganocydia corymbosa (Vent.) Bureau ex K.Schum. – C 268, 276, 1282; Vine, SF
Piriadacus erubescens (DC.) Pichon – LP 9931; C 284; Vine, SF
Proterantha glandulosa A.H.Gentry [New undescribed genus] – LP 9799, 9901; Vine, SF
Tynanthus sp. – LP10681; C 357; Vine, SF
Tynanthus labiatus (Cham.) Miers – LP 10661; Vine, SF

Boraginaceae
* *Cordia blanchetii* DC. – LP 9448; C 770; Tree, SF
Cordia curassavica (Jacq.) Roem. & Schult. – H 53485; LP 9939; Shrub, SF
Cordia superba Cham. – LP 9932; C 383, 1254; Tree, SF
Heliotropium angiospermum Murray – LP 9979; Sub, SF
Heliotropium procumbens Mill. – LP 12280; Sub, SF
Heliotropium transalpinum Vell. – C 367; Sub, SF
Tournefortia rubicunda Salzm. ex DC. – LP 9978; Shrub, SF

Brassicaceae
Capparis brasiliana DC. – LP 9843, 12079; Shrub, SF
° *Capparis flexuosa* (L.) L. – LP 9930; C 302; Vine, SF
Capparis jacobinae Moric. ex Eichler – LP 9968; Shrub, SF
Capparis lineata Pers. – H 53483; LP 9934; C 271; Vine, SF
° *Crataeva tapia* L. – LP 12056; Tree, SF

Bromeliaceae
Aechmea aquilega (Salisb.) Griseb. – LP 12055; Herb, SF
Aechmea bromeliifolia (Rudge) Baker – C 295; Herb, ShF
Aechmea nudicaulis (L.) Griseb. – C 327; Epi, RF
Billbergia porteana Brongn. ex Beer – LP 9790; Epi, SF
Bromelia pinguin L. – Not collected, Herb, RF
Catopsis sessiliflora (Ruiz & Pav.) Mez – LP 10820; C 829; Epi, ShF
Cryptanthus bahianus L.B.Sm. – LP 9793; Herb, SF
Tillandsia polystachia (L.) L. – LP 10848; Epi, SF
Tillandsia stricta Sol. ex Sims – LP 10774, 10793; Epi, ShF
Tillandsia usneoides (L.) L. – Not collected, Epi, SF
Vriesea procera (Mart. ex Schult.f.) Wittm. – LP 12251, Herb, ShF
Vriesea simplex (Vell.) Beer – C 288, Epi, ShF

Burmanniaceae
Apteria aphylla (Nutt.) Barnhart ex Small – LP 10616; C 344; Herb, RF
Gymnosiphon divaricatum (Benth.) Benth. & Hook.f. – LP 10617; Herb, RF

Cactaceae
Brasiliopuntia brasiliensis (Willd.) Haw. – LP 9469; Tree, SF
Epiphyllum phyllanthus (L.) Haw. – C 332; Epi, SF
Pereskia aculeata Mill. – LP 10697; Tree, SF

Campanulaceae
Siphocampylus imbricatus G.Don – LP 12257, Shrub, ShF

Cannabaceae
° *Celtis iguanaea* (Jacq.) Sarg. – LP 9297, 9459; Tree, SF
Trema micrantha (L.) Blume – LP 12089; Tree, SF

Cannaceae
Canna glauca L. – C 814; Herb, RF

Celastraceae
Hippocratea volubilis L. – LP 9556; Vine, RF
Maytenus erythroxylon Reissek – LP 10654; C 784; Tree, SF
Maytenus quadrangulata (Schrad.) Loes. – LP 12042, 12113; C 789; Tree, SF
Tontelea nectandrifolia (A.C.Sm.) A.C.Sm. – LP 9890, 12065; C 234; Vine, SF

Chrysobalanaceae
Hirtella glandulosa Spreng. – LP 9539, 9776; Tree, RF, SF
Hirtella racemosa Lam. – LP 9544; C 315; Shrub, RF, SF

Clusiaceae
Clusia nemorosa G.Mey. – LP 9868; C 808, 827; Tree, RF, ShF

Combretaceae
Buchenavia capitata (Vahl) Eichler – LP 9780, 12252; Tree, RF, ShF

Commelinaceae
Commelina benghalensis L. – C 348; Herb, RF
* *Dichorisandra* sp. nov. – LP 12115; C 305; Herb, SF
Gibasis geniculata (Jacq.) Rohweder – LP 10797; Herb, ShF

Connaraceae
Connarus detersus Planch. – C 298; Tree, ShF
Rourea sp. – LP 12004; Shrub, RF
Rourea doniana Baker – LP 12109; C 291; Shrub, SF
Rourea martiana Baker – LP 9894; C 242; Vine, SF

Convolvulaceae
Evolvulus glomeratus Nees & Mart. – LP 9910; C 286; Sub, SF
Evolvulus latifolius Ker Gawl. – N 1027; C 331, 1218; Sub, SF
Ipomoea sp. – LP 10740; C 766; Vine, SF
Ipomoea hederifolia L. – LP 10736; Vine, SF
Ipomoea wrightii A.Gray – LP 12283; Vine, SF
Jacquemontia confusa Meisn. – C 384; Vine, SF
Jacquemontia densiflora (Meisn.) Hallier f. – C 9483; Vine, SF
Jacquemontia martii Meisn. – LP 9985; C 389; Vine, SF
Jacquemontia montana (Moric.) Meisn. – C 319; Vine, RF
Merremia cissoids (Lam.) Hallier f. – LP 10639; C 316; Vine, SF

Costaceae
Costus spiralis (Jacq.) Roscoe – LP 9871, 9775; Herb, RF, ShF

Cucurbitaceae
Anisosperma sp. – LP 12111; Vine, SF
Apodanthera sp. – C 380; Vine, SF
Apodanthera glaziovii Cogn. – LP 12064; Vine, SF
Cayaponia cf. *petiolulata* Cogn. – LP12069; Vine, SF

Gurania sp. – LP 12086; Vine, SF
Gurania subumbellata (Miq.) Cogn. – C 1247; Vine, SF
Psiguria triphylla (Miq.) C.Jeffrey – LP 10700; Vine, SF

Cunoniaceae
Lamanonia ternata Vell. – LP 9270, 12092; Tree, RF, SF

Cyperaceae
Cyperus cf. *compressus* L. – C 1255; Herb, SF
Cyperus laxus Lam. – C 372; Herb, SF
Rhynchospora cephalotes (L.) Vahl – LP 9430, 10826; Herb, RF, SF
Rhynchospora cf. *exaltata* Kunth – LP 9428; Herb, RF
Scleria bracteata Cav. – H 55452; Herb, RF
Scleria latifolia Sw. – H 55451; LP 9242; Herb, RF

Dilleniaceae
Doliocarpus sp. – LP 9537; Vine, RF

Dioscoreaceae
Dioscorea sp. – LP 9958; Vine, SF
Dioscorea altissima Lam. – LP 12088; Vine, SF
Dioscorea dodecaneura Vell. – LP 10711, 12279; Vine, SF

Ebenaceae
Diospyros inconstans Jacq. – LP 10007; C 256; Shrub, SF
Diospyros sericea A.DC. – LP 9247, 10849; Tree, RF, SF

Elaeocarpaceae
Sloanea guianensis (Aubl.) Benth. – LP 9504, 9782; Tree, RF

Eriocaulaceae
Paepalanthus spathulatus Körn. – LP 10768; Herb, ShF
Tonina fluviatilis Aubl. – LP 10754; Herb, RF

Erythroxylaceae
Erythroxylum macrocalyx Mart. – LP 9830, 9902, 12005; Tree, RF, SF
Erythroxylum polygonoides Mart. – LP 9936, 10720; C 355; Shrub, RF, SF

Euphorbiaceae
Acalypha amblyodonta (Müll.Arg.) Müll.Arg., Shrub, SF
Acalypha brasiliensis Müll.Arg. – LP 10006, 10683, 10799; Shrub, ShF, SF
Actinostemon concolor (Spreng.) Müll.Arg. – LP 9952; Shrub, SF
Actinostemon verticillatus (Klotzsch) Baill. – B 1239; Tree, SF
Alchornea triplinervia (Spreng.) Müll.Arg. – LP 10803; Tree, ShF
Bernardia tamanduana (Baill.) Müll.Arg. – LP 12047; C 1215; Shrub, SF
Cnidoscolus oligandrus (Müll.Arg.) Pax – LP 9451, 9408; Tree, SF
Cnidoscolus urens (L.) Arthur – LP 9995; Shrub, SF
Croton betulaster Müll.Arg. – LP 9265; Shrub, RF
Croton cordiifolius Baill. – LP 12041; C 262; Shrub, SF
Croton echioides Müll.Arg. – LP 9961; Shrub, SF
Croton hirtus L'Hér. – C 1256; Sub, SF
Croton lobatus L. – LP 9926; C 801; Shrub, RF, SF
Croton sincorensis Mart. ex Müll.Arg. – LP 9895; Shrub, SF
Croton tetradenius Baill. – LP 9295, 10662; Shrub, RF, SF
Croton triqueter Lam. – C 363; Sub, SF
Croton urticifolius Lam. – C 1222; Sub, SF
Croton velutinus Baill. – LP 9271; Shrub, RF
Croton warmingii Müll.Arg. – LP 10005; Shrub, SF
Dalechampia brasiliensis Lam. – LP 9986; Vine, SF
Dalechampia cf. *pentaphylla* Lam. – LP 9402; Vine, SF
Dalechampia scandens Vell. – LP 9903; Vine, SF
Dalechampia sylvatica S.Moore – LP 10674; C 802; Vine, SF
Euphorbia comosa Vell. – LP 10806; C 1267; Herb, ShF, SF
Euphorbia hyssopifolia L. – LP 9717 , Herb, SF
Euphorbia insulana Vell. – LP 10796; C 1285; Herb, ShF, SF
Jatropha palmatifolia Ule – LP 9933; Shrub, SF
Maprounea guianensis Aubl. – LP 9761, 9869, 12044; Tree, RF, SF
Manihot sp. – C 310; Tree, SF
Manihot cf. *anomala* Pohl – LP 9904; C 385, 782; Tree, SF
Manihot cf. *epruinosa* Pax & K. Hoffm. – LP 9387; Tree, SF
Pachystroma longifolium (Nees) I.M. Johnst. – LP 10659; Tree, SF
Pera glabrata (Schott) Poepp. ex Baill. – LP 12243; C 337, 342; Tree, RF, ShF
Philyra brasiliensis Klotzsch – L 259; Tree, SF
Richeria grandis Vahl – LP 10028; Tree, RF
Sebastiania corniculata (Vahl) Müll.Arg. – LP 10632; Shrub, RF
Tragia lessertiana (Baill.) Müll.Arg. – LP 9941, 12097, 12792; Vine, ShF, SF
Tragia volubilis L. – LP 10002; Vine, SF

Fabaceae-Caesalpinioideae
Apuleia leiocarpa (Vogel) J.F.Macbr. – LP 12063; C 809; Tree, SF
Bauhinia sp.1 – LP 9817; Shrub, SF
Bauhinia sp.2 – LP 12043; Vine, SF
Bauhinia forficata Link – LP 9815; Tree, SF
Bauhinia longifolia (Bong.) Steud. – LP 10753; C 364; Tree, SF
Bauhinia maximilianii Benth. – C 787; Vine, SF
Caesalpinia aff. *echinata* Lam. – LP 9405; Tree, SF
Caesalpinia leiostachya (Benth.) Ducke – C 1250; Tree, SF
Caesalpinia pluviosa DC. – LP 12264; Tree, SF
Cassia ferruginea (Schrad.) Schrad. ex DC. var. *ferruginea* – C 301; Tree, SF
Chamaecrista nictitans var. *pilosa* (Benth.) H.S.Irwin & Barneby – LP 9278; Sub, RF
Chamaecrista rotundifolia var. *grandiflora* (Benth.) H.S.Irwin & Barneby – LP 9833; C 236; Shrub, SF
Copaifera cearensis Huber ex Ducke – LP 9586; Tree, SF
Copaifera langsdorffii Desf. – LP 10625, 10756; Tree, RF, SF
Dimorphandra jorgei M.F.Silva – C 834; Tree, ShF
Goniorrhachis marginata Taub. – LP 9966; C 311; Tree, SF
° *Hymenaea courbaril* L. – C 768; Tree, SF
Melanoxylon brauna Schott – LP 10836; Tree, SF
Peltogyne confertiflora (Hayne) Benth. – LP 10779, 10831; Tree, ShF, SF
Peltogyne aff. *recifensis* Ducke – LP 12013; Tree, SF
° *Peltophorum dubium* (Spreng.) Taub. var. *dubium* – LP 9258; C 306, 243; Tree, RF, SF
* *Phanera trichosepala* L.P.Queiroz – LP 9413; C 281; Vine, SF
° *Poeppigia procera* var. *conferta* Benth. – LP 9914; C 257; Tree, SF

° *Pterogyne nitens* Tul. – H 53478; LP 10016; C 1239; Tree, SF
Schizolobium parahyba (Vell.) S.F.Blake – Not collected, Tree, SF
Senna acuruensis var. catingae (Harms) H.S.Irwin & Barneby – LP 9251, 9824; Shrub, SF
Senna acutisepala (Benth.) H.S.Irwin & Barneby – C 1270; Tree, SF
Senna aversiflora (Herb.) H.S.Irwin & Barneby – LP 10739, Shrub, SF
Senna hirsuta (L.) H.S.Irwin & Barneby – LP 10672, 10695; Shrub, SF
Senna macranthera var. *micans* (Nees) H.S.Irwin & Barneby – LP 9292; Tree, SF
Senna multijuga var. *verrucosa* (Vogel) H.S.Irwin & Barneby – LP 9555; Tree, SF
Senna pendula (Willd.) H.S.Irwin & Barneby – LP 9453, 9980; Shrub, SF
° *Senna spectabilis* var. *excelsa* (Schrad.) H.S.Irwin & Barneby – C 360; Tree, SF

Fabaceae-Mimosoideae

Albizia polycephala (Benth.) Killip ex Record – C 274; Tree, SF
Blanchetiodendron blanchetii (Benth.) Barneby & J.W.Grimes – LP 9813, 9984; Tree, SF
Inga edulis Mart. – LP 9302; C 374; Tree, SF
Inga aff. *laurina* Desv. – LP 9990; C 807; Tree, SF
Inga subnuda Salzm. ex Benth. subsp. *subnuda* – C 289; Tree, SF
Inga thibaudiana DC. subsp. *thibaudiana* – LP 10029; C 252; Tree, RF
Mimosa invisa Mart. ex Colla – LP 9277; Shrub, RF
Mimosa tenuiflora (Wild.) Poir. – LP 12242; Tree, SF
Piptadenia sp. – LP 9255, 12007; Vine, SF
Piptadenia adiantoides (Spreng.) Macbr. – LP 9825, 10713; Vine, SF
Piptadenia paniculata Benth. – H 53481; LP 10682; Tree, SF
Pseudopiptadenia bahiana G.P.Lewis & M.P.Lima – LP 9444, 12035; Tree, SF
Pseudopiptadenia contorta (DC.) G.P.Lewis & M.P.Lima – LP 12032; Tree, SF
Samanea inopinata (Harms) Barneby & J.G.Grimes – LP 9473; Tree, SF
Senegalia sp.1 – LP 12068; Tree, SF
Senegalia sp.2 – LP 10657; Vine, SF
Senegalia martiusiana (Steud.) Seigler & Ebinger – LP 10729; C 390; Shrub, SF
Senegalia riparia (Kunth) Britton & Killip – C 351; Tree, SF
Senegalia velutina (DC.) Seigler & Ebinger – C 382; Shrub, SF

Fabaceae-Papilionoideae

Aeschynomene elegans Schul. & Cham. var. *elegans* – LP 10688; Sub, SF
Aeschynomene histrix var. *densiflora* (Benth.) Rudd – LP 9293; Sub, SF
Andira fraxinifolia Benth. – LP 9284; Tree, RF
Bionia coriacea (Ness & Mart.) Benth. – LP 9272; Shrub, RF
Bowdichia virgilioides Kunth – LP 9781; Tree, RF
Canavalia parviflora Benth. – LP 12275; Vine, SF
Centrolobium tomentosum Guill. ex Benth. – H 53496; LP 9828; Tree, SF
Centrosema sagittatum (Humb. & Bonpl. ex Willd.) Brandegee – LP 9441, 10013; Vine, SF
Centrosema virginianum (L.) Benth. – LP 9974; Vine, SF
Chaetocalyx scandens var. *pubescens* (DC.) Rudd. – LP 9454; Vine, SF
Clitoria falcata Lam. – LP 9463; Vine, SF
Clitoria laurifolia Poir. – LP 10631; Sub, RF
* *Cratylia* sp. nov. – LP 10656; CO 15; Vine, SF
Crotalaria holosericea Nees & Mart. – LP 9426; C 322; Sub, SF
Crotalaria micans Link. – LP 10651; Sub, SF
Dalbergia decipularis Rizz. & Mattos – LP 12029; Tree, SF
Desmodium barbatum (L.) Benth. – C 800; Herb, SF
Desmodium incanum (Sw.) DC. – LP 10645; Herb, SF
Desmodium tortuosum (Sw.) DC. – LP 10644; Herb, SF
Desmodium uncinatum (Jacq.) DC. – C 1248, 1271; Herb, SF
Dioclea violacea Mart. ex Benth. – C 352; Vine, RF
Galactia striata (Jacq.) Urb. – LP 10687; C 359; Vine, SF
Indigofera suffruticosa Mill. – LP 9983; Sub, SF
Lonchocarpus cultratus (Vell.) A.M.G.Azevedo & H.C.Lima – LP 10010; Tree, SF
° *Machaerium acutifolium* Vogel – LP 9433, 10000; C 290; Tree, RF, SF
Macherium aff. *gracile* Benth. – LP 12020; Tree, SF
Machaerium hirtum (Vell.) Stellfeld – C 287; Tree, SF
Macroptilium erythroloma (Mart. ex Benth.) Urb. – LP 10640; C 371; Vine, SF
Myrocarpus fastigiatus Allemão – LP 12017; C 1230; Tree, SF
Periandra coccinea (Schrad.) Benth. – LP 9993; C 249; Vine, RF, SF
Platymiscium floribundum var. *obtusifolium* (Harms) Klitgaard – LP 9920; C 1251; Tree, SF
° *Platypodium elegans* Vogel – LP 10017, 10667; Tree, SF
Poiretia punctata Desv. – LP 10650; C 778; Vine, SF
Rhynchosia edulis Griseb. – LP 10641; Vine, SF
Rhynchosia melanocarpa Grear – LP 10671; Vine, SF
Rhynchosia phaseoloides (Sw.) DC. – LP 9924; Vine, RF
Rhynchosia reticulata var. *kuntzei* (Harms ex Kuntze) Grear – C 815; Vine, SF
Stylosanthes scabra Vogel – LP 10647; Herb, SF
Swartzia acutifolia Vogel – LP 9414, 9948; Tree, SF
Swartzia apetala Raddi var. *apetala* – LP 10015, 12073; Tree, SF
Vigna sp. – LP 10749, Vine, ShF
Vigna candida (Vell.) Maréchal, Mascherpa & Stainier – LP 12272; Vine, SF
Zollernia ilicifolia (Brongn.) Vogel – LP 12030; Tree, SF

Gentianaceae

Irlbachia purpurascens (Aubl.) Maas – LP 10634; Sub, RF
Voyria aphylla (Jacq.) Pers. – LP 10618; C 345; Herb, RF

Gesneriaceae

Nematanthus albus Chautems – LP 10782, Epi, ShF
* *Sinningia* sp. nov. – LP 12277, DC 2066, Herb, SF
Sinningia barbata (Nees & Mart.) G.Nicholson – LP 10795, Herb, ShF

Heliconiaceae
Heliconia pendula Wawra – C 1272; Shrub, ShF

Humiriaceae
Vantanea compacta (Schnizl.) Cuatrec. – LP 9921; C 361; Tree, RF

Iridaceae
Trimezia spathata subsp. *sincorana* (Rav.) Chukr – LP 9771; Herb, RF

Juncaceae
Juncus microcephalus H.B.K. – LP 10757; Herb, SF

Lamiaceae
Hyptis pectinata (L.) Poit. – LP 10765; Herb, SF
Hyptis sidifolia (L'Herit.) Briq. – LP 10003; Sub, SF
Hyptis suaveolens (L.) Poit. – LP 10638; C 362; Herb, SF
Ocimum campechianum Mill. – H 28446; LP 9997; Herb, SF
Salvia fruticetorum Benth. – H 53497; LP 10792; Sub, ShF, SF
Vitex aff. *klugii* Moldenke – LP 9946, 12015; C 283, 326; Tree, RF, ShF, SF

Lauraceae
Cinnamomum sp. – LP 10023; Tree, SF
Nectandra sp. – LP 12233; Tree, SF
Nectandra cf. *membranacea* (Sw.) Griseb. – H 53500; LP 10684; C 365; Tree, RF, SF
Ocotea glomerata (Nees) Mez – LP 12059; C 795; Tree, SF
Ocotea velutina (Ness) Rohwer – LP 10635; C 1292, 1290; Tree, RF, SF

Lecythidaceae
Cariniana estrellensis (Raddi) Kuntze – LP 10008; Tree, SF

Loganiaceae
Spigelia anthelmia L. – LP 9774; Herb, RF
Spigelia scabra Cham. & Schltdl. – LP 10750, 12081; Herb, ShF, SF
Strychnos sp. – LP 9965; C 388; Vine, SF
Strychnos brasiliensis Mart. – LP 9841; C 361; Vine, SF

Loranthaceae
Struthanthus polyrrhizus Mart. – LP 10685; Epi, SF

Lythraceae
Cuphea circaeoides Sm. ex Sims – LP 12282; Herb, SF
Cuphea impatientifolia A.St.-Hil. – LP 12226; Herb, SF
Cuphea racemosa (L.f.) Spreng. – LP 9560; C 813; Herb, RF, SF
Pleurophora anomala (A.St.-Hil.) Koehne – LP 12281; Sub, SF

Malpighiaceae
Bunchosia fluminensis Griseb. – LP 9912, 12049; Shrub, SF
Byrsonima sericea DC. – LP 9257, 9994/ 9385; Tree, RF, SF
Dicella bracteosa (A.Juss.) Griseb. – LP 9977; C 273; Vine, SF
Heteropterys aff. *fluminensis* (Griseb.) W.R.Anderson – LP 9942; Vine, SF
Heteropterys macrostachya A.Juss. – LP 10780; Vine, ShF, SF
Heteropterys perplexa W.R.Anderson – C 336; Vine, RF
Mascagnia sp. – C 811; Vine, SF
Mascagnia chasei W.R.Anderson – LP 9390; Vine, SF
Mascagnia rigida Griseb. – LP 10655; Vine, SF
Mascagnia sepium (A.Juss.) Griseb. – LP 9823; Vine, SF
Stigmaphyllon blanchetii C.E.Anderson – LP 9423, 9827; Vine, RF, SF
Tetrapterys sp.1 – LP 9947; Vine, SF
Tetrapterys sp.2 – CO 16; Vine, SF
Thryallis longifolia Mart. – C 235; Vine, SF

Malvaceae
Malvaceae sp. – LP 10840; C 779; Tree, SF
Bombacopsis stenopetala (Casar.) A.Robyns – LP 9291, 10819; Tree, ShF, SF
Cavanillesia arborea (Willd.) K.Schum. – C 2295; Tree, SF
Corchorus hirtus L. – LP 10646; Sub, SF
Eriotheca cf. *globosa* A. Robyns – LP 10030, 10776; Tree, RF, ShF
Eriotheca macrophylla (K.Schum.) A.Robyns – C 1237; Tree, SF
Guazuma ulmifolia Lam. – LP 9467; C 265; Tree, SF
Helicteres macropetala A.St.-Hil. – LP 10665; Shrub, SF
Luehea candicans Mart. – LP 9458, 9290; Tree, SF
Melochia betonicifolia A.St.-Hil. – LP 9938; C 366; Shrub, SF
Melochia tomentosa L. – LP 9450; Sub, SF
Pavonia malacophylla (Link & Otto) Garcke – LP 9509; Shrub, RF
Pavonia martii Colla – LP 9853; C 1286; Sub, SF
Sidastrum micranthum (A.St.-Hil.) Fryxell – LP 10642; Sub, SF
Waltheria indica L. – LP 9245; Sub, RF
Wissadula amplissima (L.) R.E.Fr. – LP 9443; C 771; Sub, SF
Wissadula contracta (Link) R.E.Fr. – LP 12238; Sub, SF

Marantaceae
Calathea sp. – LP 9929; Herb, RF
Maranta bicolor Ker Gawl. – LP 10698; Herb, SF
Maranta divaricata Roscoe – LP 9557; B 1260; Herb, RF, SF

Marcgraviaceae
Schwartzia brasiliensis (Choisy) Giraldo-Cañas – LP 12053; Vine, SF

Melastomataceae
Clidemia hirta (L.) D.Don – LP 10619; Shrub, RF
Henriettea succosa (Aubl.) DC. – C 300; Tree, RF
Leandra aurea (Cham.) Cogn. – LP 12093; Shrub, ShF
Miconia sp. – LP 9766; Shrub, RF
Miconia albicans (Sw.) Triana – LP 9866; Shrub, RF
Miconia aff. *caudigera* DC. – LP 9536; Tree, RF
Miconia ciliata (Rich.) DC. – LP 9866; Shrub, RF
Miconia mirabilis (Aubl.) L.O.Williams – LP 10628; C 246; Tree, RF
Miconia rimalis Naudin – LP 9533; Tree, RF
Pterolepis glomerata (Rottb.) Miq. – LP 9274, 10747; Sub, RF

Meliaceae
Trichilia sp. – LP 12046; Tree, SF
Trichilia emarginata (Turcz.) C.DC. – LP 9964; Tree, SF
Trichilia hirta L. – LP 12037; Tree, SF

Moraceae
Brosimum gaudichaudii Trécul – LP 9962; C 275; Tree, SF
Brosimum guianense (Aubl.) Huber – LP 12062; C 810; Tree, SF
* *Dorstenia caatingae* R.M. Castro – LP 10701; Herb, SF

Ficus citrifolia Mill. – LP 9468, 10813; C 349; Tree, RF, ShF, SF
Ficus cyclophylla (Miq.) Miq. – LP 12071; C 308; Tree, SF
Ficus gomelleira Kunth & C.D.Bouché – LP 12078; C 354; Tree, RF, ShF
Ficus pulchella Schott ex Spreng. – LP 12058; C 978; Tree, RF, SF
Maclura tinctoria (L.) D.Don ex Steud. – LP 9982; Tree, SF
Sorocea hilarii Gaudich. – LP 12057; Tree, SF

Myrsinaceae
Cybianthus sp. – C 1276; Tree, ShF
Myrsine ferruginea (Ruiz & Pav.) Spreng. – LP 10759; C 1246; Tree, ShF, SF
Myrsine guianensis (Aubl.) Kuntze – LP 9286; C 350; Tree, RF
Myrsine venosa A.DC. – LP 10764, 12245; Tree, ShF

Myrtaceae
Eugenia sp.1 – C 772, 777; Shrub, SF
Eugenia sp.2 – LP 9991; Shrub, SF
Eugenia sp.3 – LP 12045; Tree, SF
* *Eugenia* sp. nov. – LP 10727; C 393, 1487; Tree, SF
Eugenia cf. *candolleana* DC. – LP 10723; Tree, SF
Eugenia florida DC. – C 2041; Tree, SF
Eugenia punicifolia (Kunth) DC. – LP 9283, 9796; Shrub, RF, SF
Myrcia sp.1 – C 245, 391; Tree, SF
Myrcia sp.2 – C 341; Shrub, SF
Myrcia sp.3 – LP 9949; Shrub, SF
Myrcia blanchetiana (O.Berg.) Mattos – LP 12104; Tree, ShF
Myrcia guianensis (Aubl.) DC. – LP 9959, 12006; Tree, RF, SF
Myrcia rostrata DC. – LP 9762; Tree, RF
Myrcia splendens (Sw.) DC. – LP 12009, 12074; Shrub, RF, ShF
Myrciaria floribunda (H.West ex Willd.) O.Berg – LP 10703; C 774; Tree, SF
Psidium sp. – LP 12026; Shrub, SF
Psidium cf. *brownianum* DC. – LP 12033, 12096; Tree, ShF, SF
Psidium schenckianum Kiaersk. – C 330; Shrub, SF

Nyctaginaceae
Bougainvillea spectabilis Willd. – C 263; Vine, SF
Guapira hirsuta (Choisy) Lundell – LP 9972; Tree, SF
Guapira opposita (Vell.) Reitz – LP 10009, 12080; C 1279; Tree, ShF, SF

Ochnaceae
Sauvagesia erecta L. – LP 10627; Herb, RF

Olacaceae
Heisteria blanchetiana (Engler) Sleumer – LP 12098; Tree, ShF
Schoepfia brasiliensis A.DC. – LP 9542, 10769; Tree, RF, ShF
Ximenia americana L. var. *americana* – LP 10775; C 266, 1238; Tree, ShF, SF

Orchidaceae
Bulbophyllum sanderianum Rolfe – C 312; Epi, RF
Campylocentrum micranthum (Lindl.) Rolfe – LP 9535; Epi, RF
Cleistes metallina (Barb. Rodr.) Schltr. – LP 10630; Herb, RF
Cleistes pluriflora (Barb. Rodr.) Schltr. – LP 12256; Herb, ShF
Dichaea cogniauxiana Schltr. – C 1269; Herb, ShF
Eltroplectris calcarata (Sw.) Garay & H.R.Sweet – LP 9424; Herb, RF
Eltroplectris triloba (Lindl.) Pabst – LP 9424; Herb, RF
Eurystylis actinosophila (Barb. Rodr.) Schltr. – LP 10823; Epi, ShF
Galeandra beyrichii Rchb. f. – H 53499; LP 9506; Herb, RF, SF
Maxillaria sp. – C 1297; Epi, SF
Notylia hemitricha Barb. Rodr. – LP 9464; Epi, SF
Oeceoclades maculata (Lindl.) Lindl. – LP 9438; Herb, RF
Oncidium ciliatum Lindl. – LP 10798; Epi, ShF
Oncidium flexuosum (Kunth) Lindl. – LP 10785, Epi, ShF
Pogoniopsis schenkii Cogn. – LP 12255, Herb, ShF
Polystachya estrellensis Rchb.f. – LP 10808; Epi, ShF
Prescottia oligantha Lindl. – LP 9534; Herb, RF
Prosthechea aemula (Lindl.) W.E.Higgins – C 1295; Epi, SF
Psilochilus cf. *modestus* Barb. Rodr. – LP 9507; Herb, RF
Rauniella sp. – S 674; Epi, ShF
Scaphyglottis modesta Schltr. – LP 10818; Epi, ShF
Sobralia sessilis Lindl. – H 55461; LP 10791; Herb, ShF
Stelis sp. – LP 10812; Epi, ShF
Wullschlaegelia calcarata Benth. – LP 10767; Herb, ShF

Oxalidaceae
Oxalis barrelieri L. – H 53498; LP 12225; Sub, SF
Oxalis neuwiedii Zucc. – LP 9988; C 1262; Herb, SF
Oxalis roselata A.St.-Hil. – LP 10699; Herb, SF

Passifloraceae
Passiflora alata Dryander – LP 10622; Vine, RF
Passiflora bahiensis Klotzsch – LP 10675, 12235; Vine, SF
Passiflora cincinnata Mast. – C 314, 1268; Vine, SF
Passiflora edulis Sims – LP 9875; Vine, SF
Passiflora galbana Mast. – LP 9305, 10623; C 1281; Vine, RF, ShF, SF
Passiflora organensis Gardner – LP 9288; Vine, SF
Passiflora setacea DC. – LP 10011, 9907; Vine, SF
Passiflora suberosa L. – C 1244; Vine, SF

Phyllanthaceae
* *Astrocasia jacobinensis* (Müll.Arg.) G.L.Webster – C 1235; Tree, SF
Phyllanthus sp. – LP 12117; Herb, SF
Phyllanthus niruri L. – C 1259; Herb, SF

Phytolaccaceae
Gallesia integrifolia (Spreng.) Harms – C 1257; Tree, SF
Microtea paniculata Moq. – LP 12083; Herb, ShF, SF
Rivina humilis L. – LP 10648; Shrub, SF
Seguieria floribunda Benth. – LP 12261; Vine, SF

Piperaceae
Peperomia sp. – C 294; Epi, ShF
Peperomia cf. *glabella* (Sw.) A.Dietr. – LP 9460, 10708; Herb, SF
Piper aduncum L. – LP 9559; Shrub, RF
Piper amalago L. – LP 10004; Shrub, SF
Piper arboreum Aubl. var. *arboreum* – LP 9241, 9466; C 793; Shrub, RF, SF

Plumbaginaceae
Plumbago scandens L. – LP 12266, Herb, SF

Poaceae
Poaceae sp. – LP 9243; Herb, RF
Ichnanthus bambusiflorus (Trin.) Döll – H 55450; Herb, SF
Ichnanthus grandifolius (Döll) Zuloaga & Soderstr. – H 53510; Herb, ShF
Ichnanthus pallens (Sw.) Munro ex Benth. – LP 9783; Herb, RF
Olyra latifolia L. – LP 12231; Herb, SF
Parodiolyra micrantha (Kunth) Davidse & Zuloaga – LP 9429, 9927; Herb, RF
Raddia portoi Kuhlm. – DC 2063; Herb, SF
Streptostachys asperifolia Desv. – LP 12019; Herb, SF

Polygalaceae
Bredemeyera martiana A.W.Benn. – LP 10844; Vine, SF
Polygala mollis Kunth – LP 9540; Herb, RF
Polygala paniculata L. – H 55457; Herb, SF
Polygala urbani Chodat – LP 9279, 9975; Sub, RF, SF
Polygala violacea Aubl. – LP 9897; Sub, SF
Securidaca diversifolia (L.) S.F.Blake – LP 9842, 9893; Vine, SF
Securidaca lanceolata A.St.-Hil. & Moq. – LP 9870; Vine, RF

Polygonaceae
Coccoloba alnifolia Casar. – LP 1071; C 1260; Tree, SF
Coccoloba declinata (Vell.) Mart. – LP 12031; C 1253; Vine, SF

Portulacaceae
Talinum paniculatum (Jacq.) Gaertn. – LP 9461; Herb, SF
Talinum triangulare (Jacq.) Willd. – C 1266, Herb, SF

Proteaceae
Roupala montana Aubl. – LP 9514, 9923; Tree, RF, ShF

Rafflesiaceae
Pilostyles blanchetii (Gardner) R.Br. – H 53495; Epi, SF

Rhamnaceae
° *Ziziphus joazeiro* Mart. – LP 9831; Tree, SF

Rubiaceae
° *Alseis floribunda* Schott – LP 9905; Tree, SF
Amaioua guianensis Aubl. – C 323, 1164; Shrub, RF, SF
Borreria latifolia (Aubl.) K.Schum. – LP 10744; Herb, SF
Chiococca alba (L.) Hitchc. – H 53493; LP 12087; Shrub, SF
Chomelia sp. – LP 12114; Tree, SF
Coccocypselum sp. – LP 10629; C 251; Herb, RF
° *Coutarea hexandra* (Jacq.) K.Schum. – LP 10817; C 1165; Tree, ShF, SF
Declieuxia fruticosa (Willd. ex Roem. & Schult.) Kuntze – LP 9260,10834; C 248; Herb, RF, SF
Diodella apiculata (Willd. ex Roem. & Schult.) Bacigalupo & E.L.Cabral – LP 10741; Sub, SF
Emmeorhiza umbellata (Spreng.) K.Schum. – LP 10846; Vine, SF
Faramea hyacinthina Mart. – LP 9956; Shrub, SF
Hamelia patens Jacq. – LP 10021; C 373; Shrub, SF
Manettia cordifolia Mart. – LP 10676; Vine, SF
Mitracarpus frigidus K.Schum. – LP 10761; Sub, SF
Mitracarpus hirtus (L.) DC. – LP 10742; Herb, SF
Molopanthera paniculata Turcz. – LP 9285; Tree, SF
Palicourea blanchetiana Schltdl. – LP 9864, 9760, 10621; Shrub, RF
Margaritopsis carrascoana (Delprete & E.B.Souza) C.M.Taylor & E.B.Souza – LP 9953; Shrub, SF
Psychotria carthagenensis Jacq. – LP 9246, 10614; Shrub, RF
Psychotria chaenotricha DC. – LP 12034; C 264, 261; Shrub, SF
Psychotria hoffmannseggiana (Willd. ex Roem. & Schult.) Müll. Arg. – LP 10633; Shrub, RF
Randia armata (Sw.) DC. – LP 10704; Tree, SF
* *Spermacoce* sp. nov. – LP 10828; C 1294; Herb, SF
* *Standleya* sp. nov. – LP 10835; C 764; Herb, SF

Rutaceae
Almeidea rubra A. St.-Hil. – LP 10706; C 303; B 1261; Shrub, SF
Angostura bracteata (Nees & Mart.) Kallunki – LP 9844, 10653; Shrub, SF
* *Conchocarpus* sp. nov. – LP 9845, 10845; C 392, Shrub, SF
Conchocarpus heterophyllus (A.St.-Hil.) Kallunki & Pirani – H 28448; LP 9908; C 769; Shrub, SF
Conchocarpus macrophyllus J.C.Mikan – C 786; Shrub, SF
Dictyoloma vandellianum A.Juss. – LP 9547; Tree, RF, SF
Esenbeckia grandiflora Mart. subsp. *grandiflora* – C 785; Tree, SF
Esenbeckia leiocarpa Engl. – C 780; Tree, SF
Helietta glaziovii (Engl.) Pirani – LP 12052; Tree, SF
Pilocarpus riedelianus Engl. – LP 9791, 12067; Shrub, SF
Pilocarpus spicatus A.St.-Hil. subsp. *spicatus* – LP 10658; C 836; Tree, SF
Zanthoxylum acuminatum (Sw.) Sw. – C 267, 783; Tree, SF
Zanthoxylum cf. *nigrum* Mart. – C 1233; Tree, SF
Zanthoxylum rhoifolium Lam. – LP 10624; Tree, RF
Zanthoxylum tingoassuiba A.St.-Hil. – C 1486; Tree, SF

Salicaceae
Casearia arborea (Rich.) Urb. – H 53489; Tree, SF
Casearia javitensis Kunth – LP 9891; C 334; Shrub, RF, SF
Casearia sylvestris Sw. – LP 12110; C 776; Tree, SF

Sapindaceae
Allophylus cf. *laevigatus* Radlk. – LP 12050; C 307, 1234; Shrub, SF
Allophylus sericeus (Cambess.) Radlk. – H 53488; LP 12070, Tree, SF
Averrhoidium gardnerianum Baill. – LP 9809; Tree, SF
Cardiospermum corindum var. *elongatum* (Radlk.) F.A.Barkley – LP 10020; Vine, SF
Cupania rigida Radlk. – LP 9455, 9835, 10841; Tree, RF, SF
Paullinia elegans Cambess. – LP 10670; Vine, SF
Paullinia racemosa Wawra – LP 10842; Vine, SF
Paullinia revoluta Radlk. – C 773; Vine, SF
Serjania sp. – LP 9386; C 386; Vine, SF
Serjania fuscifolia Radlk. – LP 9384, 10719; Vine, SF
Serjania pernambucensis Radlk. – LP 9249, 12190; Vine, SF
Thinouia sp. – LP 9439; C 1245; Vine, SF
Urvillea laevis Radlk. – LP 9449; Vine, SF
Urvillea ulmacea Kunth – LP 9259, 9388; Vine, RF, SF

Sapotaceae
Chrysophyllum gonocarpum (Mart. & Eichler ex Miq.) Engl. – LP 9298; C 788; Tree, SF

Chrysophyllum rufum Mart. – LP 12048; Tree, SF
Manilkara rufula (Miq.) H.J.Lam – LP 12054; Tree, ShF, SF
Pouteria sp.1 – LP 9452; Tree, SF
Pouteria sp.2 – LP 9407, 12112; Tree, SF
Pouteria ramiflora (Mart.) Radlk. – LP 9772; C 233, 775; Tree, RF, SF

Simaroubaceae
Simarouba amara Aubl. – LP 9303; Tree, SF

Smilacaceae
Smilax sp. – C 370; Vine, SF

Solanaceae
° *Brunfelsia uniflora* (Pohl) D.Don – H 53494; Tree, SF
Cestrum gardneri Sendtn. – LP 10702; Tree, SF
Cestrum laevigatum Schltdl. – LP 10024; Shrub, SF
Dyssochroma viridiflora Miers – LP 10777; Vine, ShF
Heteranthia decipiens Nees & Mart. – LP 10710; Herb, SF
Metternichia princeps Mik. – LP 9287; C 258; Shrub, SF
Schwenkia americana L. – LP 10745; Sub, SF
* *Solanum* sp. nov. – LP 10850; Shrub, SF
Solanum caavurana Vell. – C 377; Shrub, SF
Solanum crinitum Lam. – LP 9549; Shrub, SF
Solanum depauperatum Dunal – LP 10801; Shrub, ShF
Solanum jabrense Agra & M.Nee – LP 9432, 10014, 10838; Shrub, RF, SF
Solanum palinacanthum Dunal – LP 12236; Sub, SF
Solanum paniculatum L. – B 1237; Shrub, SF

Styracaceae
Styrax camporum Pohl – LP 3541; C 335; Shrub, RF, SF

Trigoniaceae
Trigonia bahiensis E.F.Guimar., Miguel & Fontella – LP 9937, 10660; C304; Vine, SF
Trigonia eriosperma (Lam.) Fromm & E.Santos – C 781; Shrub, SF
Trigonia nivea Cambess. var. *nivea* – LP 9957; C 282; Vine, SF
Trigonia nivea var. *pubescens* (Cambess.) Lleras – LP 9252, 9798, 9874; Vine, SF

Turneraceae
Turnera cearensis Urb. – H 53491; LP 9922; C 1220; Shrub, SF

Urticaceae
Cecropia pachystachya Trécul – LP 9770; RC 1031; Tree, RF, SF
Urera caracasana (Jacq.) Gaudich. ex Griseb. – LP 12076; Tree, SF
Urera nitida (Vell.) Brack – LP 9465; Shrub, SF

Verbenaceae
Aloysia virgata (Ruiz & Pav.) Juss. – LP 9834; Shrub, SF
Lantana camara L. – LP 9859; C 1212; Shrub, SF
Lantana canescens Kunth – LP 12240; Shrub, SF
Lantana fucata Lindl. – LP 10726; Sub, SF

Violaceae
Anchietea selloviana Cham. & Schltdl. – C 279; Shrub, SF
Hybanthus atropurpureus (A.St.-Hil.) Taub. – H 53479; Shrub, SF
Hybanthus calceolaria (L.) Schulze-Menz – C 379; Herb, SF

Viscaceae
Phoradendron crassifolium (Pohl ex DC.) Eichler – C 293; Epi, SF
Phoradendron mucronatum (DC.) Krug & Urb. – LP 10847; C 329; Epi, SF
Phoradendron perrottetii (DC.) Eichler – LP 9550; C 328; Epi, RF
Phoradendron cf. *pteroneuron* Eichler – LP 12066; Epi, SF

Vitaceae
Cissus albida Cambess. – C 250; Vine, RF

Vochysiaceae
Vochysia sp. – Not collected, Tree, ShF

Xyridaceae
Xyris jupicai Rich. – LP 10755; Herb, SF

PTERIDOPHYTES

Aspleniaceae
Asplenium auriculatum Sw. – LP 12102; Herb, ShF
Asplenium serra Langsd. & Fisch. – LP 10766; Herb, ShF

Cyatheaceae
Cyathea delgadii Sternb. – LP 9263; Tree, RF

Dennstaedtiaceae
Lindsaea lancea (L.) Bedd. – LP 9512; Herb, RF
Lindsaea stricta (Sw.) Dryand. – LP 9545; Herb, RF

Dryopteridaceae
Ctenitis submarginalis (Langsd. & Fisch.) Ching – C1273; Herb, ShF

Lycopodiaceae
Lycopodiella cernua (L.) Pic. Serm. – C 804; Sub, SF

Polypodiaceae
Niphidium crassifolium (L.) Lellinger – LP 10805; Herb, ShF
Microgramma geminata (Schrad.) Presl – LP 9792, Epi, SF
Microgramma squamulosa (Kaulf.) de la Sota – LP 10814; Epi, ShF
Polypodium catharinae Langsd. & Fisch. – C 831; Epi, ShF
Polypodium triseriale Sw. – LP 10815; Herb, ShF

Pteridaceae
Doryopteris lomariacea Kl. – LP 9398; Herb, SF

Schizaeaceae
Anemia cf. *filiformis* Sw. – LP 12267; Herb, SF
Anemia hirsuta (L.) Sw. – LP 9289; Herb, SF
Schizaea elegans (Vahl) Sm. – LP 9266; Herb, RF

Selaginellaceae
Selaginella muscosa Spring – LP 10809; Herb, ShF

Thelypteridaceae
Thelypteris salzmannii (Fée) C.V.Morton – LP 9472; Herb, SF

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